

EXHIBIT 4
**[UNREDACTED VERSION OF
DOCUMENT SOUGHT TO BE SEALED]**



Grenada BP ECQ Approved Final 6-5-12

- Grenada Core Team
- Seagate Technology



Grenada ECQ Approval Request

Grenada Core Team is presenting the following package requesting approval for ECQ release of the Grenada BP Family.

I have included updated YIP charts, PCO 17.3 yields and Test Times and actions to close NHK NMD and DSP disc contact actions common to all the Grenada family. PCO 7.3 is now approved by Reli.

If you have any questions or concerns please contact Pat Dewey or a member of the Grenada Core Team.

Go Grenada!

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Grenada Blockpoint

- Blockpoint Changes

- **New SoC: Luxor+**
(Grenada Classic was Luxor)
 - Improved Areal Density Capability (ADC) for better margin (new read/write channel)
 - Increases factory drive yield; 4 – 10%, depending on capacity, initial results.
- **New Motor Controller/Power ASIC: Dillon** (Used on Bacall)
(Grenada Classic was McKinley)
 - Smaller form factor
 - Lower power consumption
- **PCBA Changes**
 - Support Luxor+ changes
 - Support Dillon changes
 - Reduced part count - EMAC (Electronic Micro Acuator Controller) in SoC
- **Firmware Changes**
 - Modified for Luxor+
 - Modified for Dillon
- **May include Fuji as 2nd source media supplier**
 - For supply flexibility



Grenada BP Configuration

ECQ Configuration:

ECQ Firmware – AA3P with xxE5 servo or greater

- **Material:**
 - **2,4,5 and 6 Hd configurations**
 - **Sort 5, 6, or 7 PCO7.3 or greater**
 - **Media: G5B, G5L**
 - **Motor: Nidec, Alphana**
 - **PreAmp: LSI, TI**
 - **Servo: Dillon RevCA ST**
 - **DDR2: Current approved vendors for the family**
 - **Factories: Korat, Wuxi, Suzhou**

GrenadaBP Product Strategy ECQ

Product Strategy

- Using the Grenada platform, improve cost, yield and reliability to enable a long profitable product life

Keys to Success

- Deliver a reliable, yield improved product for the PC Commercial and Consumer segment at best \$/GB

Product Definition (*Leverages Grenada Classic*)

- **GrenadaBP** – 7200RPM; 1TB, 2TB and 3TB Native Capacities; Limited and opportunistic waterfall to 500GB, 1.5TB and Non-native 2TB
 - PC (commercial and consumer), Surveillance, and External Storage Markets
- **GrenadaBP NLL** – 7200RPM; 1TB, 2TB and 3TB
 - *Cloud Service Providers (NLL). Customers value \$/GB over performance*

High Level Business Case

Update for Gen 1 Entry

Grenada Lifetime Financials	
Gen1 Entry Oct 2011	April 3YP Apr 2012
57.8M Units	74.4M Units
\$2.9B Revenue	\$5.2B Revenue
\$946M Contrib Profit	\$2.9B Contrib. Profit
33% Contrib Margin	56% Contrib. Margin

Changes from Gen1 Entry Contract

- Changes to TVC calculation (removed external adders)
- Added NLL Segment
- Added transition to BP2 to the end of the program (Begins FQ4-13)

Assumptions:

- Includes 6.1M units for NLL
- April CMC with 0.5% - 1% quarterly takedown
- Vol and AUP Apr Outlook RevPlan through FQ1-14
- Vol for outer quarters: Market reasearch TAM April 2012, 50% share
- WF capacities not included in calculation

Metric Highlights

Next Phase Gate/Schedule

DPPM:

•Integration

Korat	Wuxi	Suzhou	"RDT3"
NA	NA	NA	1.9K

•Goal:

Gen2	SBS	CTU	SAD	Vol.
20k	15k	4k	2k	500

MTBF:

•Demo:

Validated	Potential
243K	482K

•Goal:

Gen 2:	SBS SAD	SAD
200k	75k	250k

TVM:

Pass Rate	CTU Goal:
1D: 97%	95%
2D: 98%	95%
3D: 95%	95%

Milestone	Date
SBS SAD	4/18/2012
Apple CTU SMS	4/13/2012

Issues

•Integration DPPM – 1075 tested with 2 failures 1.9K

- RDT 3.0: 1073 Drives with GPF17x.CCD4.AA2200.ZZZZ + x7DE Servo @ 1009 Hours, 36 failures
- Command Completion Timeouts -13
- New Defects-6
- Bad Write with LSI Preamp-2
- Can Not Duplicate-3
- Head Instability-5
- Skip Write-2
- Bad Write with TI Preamp-2
- Faulty servo Controller Chip-1
- Fly Height Modulation, Write-1
- SLT 05 Plating Bath-1

Gen 2 TVM

•116 drives Completed TVM!

• Open Issues:

- 1X 4H failure for EC 7 S/N Z1E0HHL8 (SOF263277)
- 3X 6H failure for EC 36 S/N Z1F0J83W (SOF262999)
- EC 216 S/N Z1F0K0SL (SOF264245) Performance Degradation
- EC 7 S/NZ1F0K0ER (SOF263764)

FA / Issue Summary

Open PFLs

Total	< 7 Days	7-15 Days	15-21 Days	21-28 Days	> 28 Days
129	3	0	0	0	126

Issues

Total	Open	CA Imp.	CA Ver.	Unresolved
17	4	13	3	10

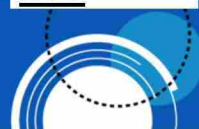
SSO

•None

DA:

•None

Near-term Schedule



Metrics

6. Qualification CTU

05/17/2012

Deliverables	Status
168-Hr DPPM Goal Achieved	Achieved 4.4K DPPM
All contract items are within variance and projected to remain so	Yes
Complexity Health Index - Does not deviate from Phase 0 Contract	Yes
Component sources defined on the SSP approved to AML level AE/AB. Exceptions have defined/underpinned closure plans. Qualified Sources can support Master Schedule Requirements.	Yes
CTU Configuration can be produced in volume for 90 days with no configuration changes planned during this time which violate customer sensitivity.	Yes
CTU Documentation released.	Yes
- Includes Product manual and Safety/Agency and FIPS Certifications.	Yes
Design Engineering Checklists Complete: Mech, Servo, EI, HDIG/ RSS, Firmware, RHMO	Yes
DMT Criteria Met	Yes
Exceptions to previous Phase Review closed	Yes
Head Electrical Test Yields meet Phase 0 Targets	Yes
Integration DPPM Goal Achieved	Yes
MR/DR aligned with Gap Closure Plans Defined	Yes
MTBF Achieved	Yes, 243-285K
No High Risk Issues	Yes, Joint Qual started but not completed
- All testing applies	In-progress
PDP Deliverables completed and entered into SLAM database.	Yes, leveraged Grenada
Process Readiness Audit and Process Verification Test Results approved by the Volume Factory and Design Center.	Yes
- Includes QA Hardware/Software Readiness	Yes
- Includes Rework Qualification Plan in place with closure by SAD.	Yes
Product meets specification for all potential product configurations	Yes
Product Stewardship Certification Status Report Completed, vs. Goal of 90% by CTU	Yes
Qualification Testing Complete and test plan documented for next phase.	Yes
- Gen 2/3 Product Assurance	Yes
- Critical Customer Pre-Qualification	Yes
- Firmware/Compatibility	Yes
- Design Engineering	Yes
- Head/Media Life	Yes
Throughput Yields and Test Times meet Phase 0 Targets	Yes

7. Pilot SAD

05/17/2012

Deliverables
168-Hr DPPM Goal Achieved
All contract items are within variance and projected to remain so
Complexity Health Index - Does not deviate from Phase 0 Contract
Component sources defined on the SSP approved to AML level AB. Exceptions have defined/underpinned closure plans. Qualified Sources can support Master Schedule Requirements.
Contamination Management Plan
Design Engineering Checklists Complete: Mech, Servo, EI, HDIG/ RSS, Firmware, RHMO
DMT Criteria Met
Exceptions to previous Phase Review closed
Head Electrical Test Yields meet Phase 0 Targets
Integration DPPM Goal Achieved
Inventory / Material Disposition
- Complete roll-up of all Factory and DC pre-SAD config inventory/WIP/FG and Disposition
MTBF Achieved
No High Risk Issues
- All testing applies
PDP Deliverables completed and entered into SLAM database.
Process Readiness Audit and Process Verification Test Results approved by the Volume Factory and Design Center.
- Includes QA Hardware/Software Readiness
- Includes Rework Qualification Plan in place with closure by SAD.
Product Stewardship Declaration of Compliance at a minimum of 95% completed.
Testing Complete - Product Assurance, Firmware/Compatibility & Engineering Regression
Throughput Yields and Test Times meet Phase 0 Targets

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Materials Outlook

None of these are gating to ECQ Approval, normal ongoing qual stuff to keep a product of this size going...I added the updates in bold for volume need etc.

Dillon - Adds Agrate Fab site, Qual builds next week, **ECD Qual completion by WW04**

Luxor+ - Adds 2.1 SCC packaging site, RGA this week, **Required to support volume beginning FQ2'13**

ODM Media - Fuji in test, Risk call mid next week, **RGA planned for the end WW47**

RMO Media - both G8.5+ and G8.5L are in qual.

Preamp - LSI Grace Fab qualified, scheduling RGA for WW51, **ECD qual completion WW3-4. Volume requirement beginning FQ2'13**

Preamp - TI 2ch EAA from Miho and FFAB. Eval drives built, Qual drives from FFAB should be getting to SZ now. Miho Qual builds next week. **Qualification ECD by WW01'13. Volume need beginning mid FQ2'13**

DDR - Hynix Shrink, Qual completed, RGA built Tues, adding to BOMs now. **Currently Qualified on Bacall Classic, Grenada BP and Bacall BP. This was a Grenada Classic Regression before moving to full approval. Standard Die depletes WW47. 100% implementation with shrink at that time.**

DDR - Winbond Shrink, Eval completed should be on the dock. **Planned qual as Post SAD. Qual builds completed this week and should be en route to SZ WW47. ECD Qual by WW51. Depletion of current die by calendar year end. No supply gaps with Winbond standard die through that point.**

Epson Crystal (glass package) - RGA only (deemed low risk), build this week. **Adds supply capacity only to existing part, common across multiple products. Required beginning FQ1 to support volumes**

Micro Semi - 5V Regulator from Unisem (packaging site). Included on Epson SBR. Again deemed low risk. **Adds backend volume capacity with additional packaging site. MS is sole sourced on Grenada.**

SIT Pivot Bearing (1-2-3D) - Flood recovery. Eval builds in late June. **Supply capability for volume. 3rd source originally qualified with Grenada Classic as a pre Flood supplier. Site qual end May, samples 6-8wks from site approval.**

DSP - JCY and Altum (improved clamping area and supplier ID) - Low Risk, staging RGA over the next few weeks. **Altum RGA completed, Yields on line with Current version, approval on hold pending resolution of high DPPM for particles. MSL detail WW47. JCY material Staged for RGA next week. Design change driven by FOF for improved clamping area and vendor id**

Grenada ECQ Request

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Product Name: Grenada BP

Approval Date: June 5 , 2012

Design Center: LCO

Goal: Authorizes Shipments for CTU and Disty/OEM Customers

Volume Factory: Korat, Wuxi, Suzhou

Configuration: 500GB 2Hd, 1TB, 1.5TB, 2.0TB, 2.5TB, 3.0TB SATA

Design Center Approval:

Pat Dewey

Pat Dewey
Core Team Lead

Brent VanDerVliet

Brent VanDerVliet
Exec Dir Prd Eng

Frank Murphy

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Mike Kepler

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Emil Yappert

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VP, PLM

Mike Foye

Mike Foye
Ex Dir, TCM

Val LaRoche

Val LaRoche
Sr. Dir Finance

Kian Fatt Chong

Kian Fatt Chong
VP Mfg

Jeff Mason

Jeff Mason

VP Design Engineering

Exceptions Approval for ECQ

Andy Davis

SVP , LCO Design Engineering

John Grieci

SVP, Customer Advocacy

Back Up



Grenada Block Point

Case 3:15-cv-00528-JCS

Document 155-4

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CRT 1

RDT 3

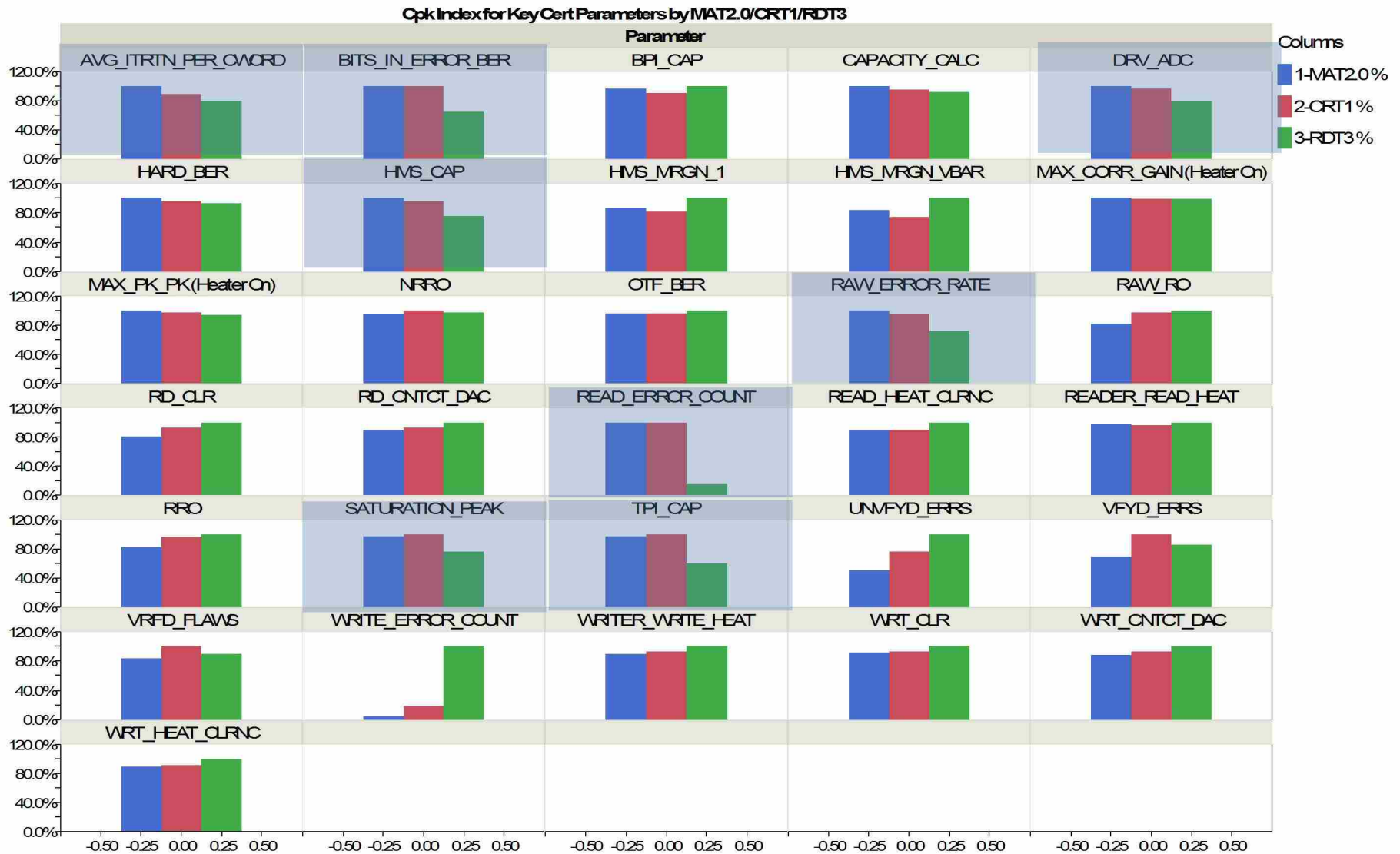
Category	# of Params	MAT 2 Cpk Index	CRT 1 Cpk Index	RDT 3 Cpk Index
Clearance	11	90%	90%	98%
Defects	5	62%	79%	78%
Servo	5	92%	98%	98%
SNR	10	99%	96%	82%

	raw MTBF	F.E. demo'd MTBF
MAT 2	26K	45K
CRT 1	39K	89K
*RDT 3	83K	173K

*as of 4/24/2012. This is the first RDT, there is no RDT1 or RDT2

For each parameter, the best Cpk of the three test beds was given a 100%, and the other two Cpk's are expressed as a percent of that. We are calling this a Cpk index. I introduced the category to calculate the equally weighted average Cpk Index. As seen in summarized table on top right, the concern is on SNR category, which keeps dropping as phase goes forward. In details, the parameters in orange are of concern, which are mostly SNR related. I will talk to product engineer to see if this makes sense to them.

Category	Test Name	Parameter Name	MAT 2 Cpk Index	CRT 1 Cpk Index	RDT 3 Cpk Index
Clearance	p_settling_summary	HMS_MRGN_1	87%	82%	100%
Clearance	p_settling_summary	HMS_MRGN_VBAR	84%	75%	100%
SNR	p_vbar_format_summary	BPI_CAP	97%	91%	100%
SNR	p_vbar_format_summary	DRV_ADC	100%	96%	79%
SNR	p_vbar_format_summary	TPI_CAP	97%	100%	60%
Clearance	p_vbar_hms_adjust	HMS_CAP	100%	96%	76%
SNR	p_wrt_pwr_picker	CAPACITY_CALC	100%	95%	92%
SNR	p_wrt_pwr_picker	SATURATION_PEAK	98%	100%	76%
Servo	p033_pes_hd2	NRRO	95%	100%	98%
Servo	p033_pes_hd2	RAW_RO	82%	98%	100%
Servo	p033_pes_hd2	RRO	82%	97%	100%
SNR	p051_erasure_ber	BITS_IN_ERROR_BER	100%	100%	64%
SNR	p051_erasure_ber	HARD_BER	100%	95%	93%
SNR	p051_erasure_ber	OTF_BER	97%	96%	100%
Defects	p107_verified_flaws	VRFD_FLAWS	84%	100%	90%
Defects	p109_lul_error_count	READ_ERROR_COUNT	100%	100%	15%
Defects	p109_lul_error_count	WRITE_ERROR_COUNT	4%	18%	100%
Defects	p109_sum_hd_zone	UNVFD_ERRS	50%	77%	100%
Defects	p109_sum_hd_zone	VFYD_ERRS	69%	100%	85%
Clearance	p135_final_contact	RD_CLR	81%	93%	100%
Clearance	p135_final_contact	RD_CNTCT_DAC	90%	93%	100%
Clearance	p135_final_contact	WRT_CLR	92%	93%	100%
Clearance	p135_final_contact	WRT_CNTCT_DAC	88%	93%	100%
Servo	p150_gain_sum	MAX_CORR_GAIN (Heater On)	100%	99%	99%
Servo	p150_gain_sum	MAX_PK_PK (Heater On)	100%	98%	94%
Clearance	p172_afh_dh_clearance	READ_HEAT_CLRNC	89%	90%	100%
Clearance	p172_afh_dh_clearance	WRT_HEAT_CLRNC	90%	92%	100%
Clearance	p172_afh_dh_working_adapt	READER_READ_HEAT	97%	96%	100%
Clearance	p172_afh_dh_working_adapt	WRITER_WRITE_HEAT	89%	93%	100%
SNR	p250_error_rate_by_zone	AVG ITRTN_PER_CWORD	100%	89%	80%
SNR	p250_error_rate_by_zone	RAW_ERROR_RATE	100%	95%	71%



This shows same information as previous slide, but in a better way of visualization. The parameters of concern were shaded.

Grenada Block Point

	raw MTBF	F.E. demo'd MTBF
MAT 2	26K	45K
CRT 1	39K	89K
*RDT 3	83K	173K

*as of 4/24/2012. This is the first RDT, there is no RDT1 or RDT2

For each parameter, the best Cpk of the three test beds was given a 100%, and the other two Cpk's are expressed as a percent of that. We are calling this a Cpk index. I am using this method for the time being until the CGI growth index team and I agree on proper Cpk calculation limits for each parameter instead of the set of limits I used for the first round of calculations. After this I will expect some parameters to have well below 100% for all three test beds if that parameter has not matured to a point of high margin for quality. Parameters of relative concern are highlighted in orange. The equally weighted average Cpk Index has matured in tandem with the improvement of MTBF between the three test beds, but some individual parameters actually got worse. Please note GrenadaBP used "RDT3" for the first RDT.

Head or Disc Component Parameter		MAT 2 Cpk Index	CRT 1 Cpk Index	RDT 3 Cpk Index
Low	HEAD_COLD_RD_RES	96%	98%	100%
Low	HEAD_CTQ_AMP	100%	99%	97%
Low	HEAD_CTQ_ASYM	84%	93%	100%
Low	HEAD_CTQ_BER	99%	99%	100%
Low	HEAD_CTQ_CP_CLRNC	100%	99%	93%
Low	HEAD_CTQ_HGA_ADC	100%	85%	71%
Low	HEAD_CTQ_HTR_RES	54%	66%	100%
Low	HEAD_CTQ_OVW	99%	100%	99%
Low	HEAD_CTQ_POL	96%	93%	100%
Low	HEAD_CTQ_RD_RES	96%	98%	100%
Low	HEAD_CTQ_RD_WDTH	100%	82%	75%
Low	HEAD_CTQ_SRVO_LIN	85%	93%	100%
Low	HEAD_CTQ_WIJITA	86%	91%	100%
Low	HEAD_CTQ_WRT_RES	70%	84%	100%
Low	HEAD_CTQ_WRT_WDTH	54%	66%	100%
Low	HEAD_HIRP_ERR	94%	100%	87%
Low	HEAD_WR_RD_OFF	78%	81%	100%
High	APREIOSUM_RAW_TA_COUNT	100%	93%	93%
High	APREIOSUM_TOTAL_SITE_GROUP	77%	100%	70%
High	HEAD_COLD_RD_RES	86%	89%	100%
High	HEAD_CTQ_AMP	90%	93%	100%
High	HEAD_CTQ_ASYM	93%	94%	100%
High	HEAD_CTQ_BER	71%	71%	100%
High	HEAD_CTQ_CP_CLRNC	63%	67%	100%
High	HEAD_CTQ_HGA_ADC	63%	100%	90%
High	HEAD_CTQ_HTR_RES	50%	57%	100%
High	HEAD_CTQ_OVW	63%	71%	100%
High	HEAD_CTQ_POL	92%	93%	100%
High	HEAD_CTQ_RD_RES	84%	89%	100%
High	HEAD_CTQ_RD_WDTH	100%	83%	74%
High	HEAD_CTQ_SRVO_LIN	72%	80%	100%
High	HEAD_CTQ_WIJITA	99%	95%	100%
High	HEAD_CTQ_WRT_RES	75%	97%	100%
High	HEAD_CTQ_WRT_WDTH	96%	100%	89%
High	HEAD_HIRP_ERR	75%	78%	100%
High	HEAD_WR_RD_OFF	94%	100%	96%
Equal Weighted Avg Cpk Index		84%	88%	95%

Grenada PCO 7.3 Results

Station	Eval Number									
	KTGBD2TP73	KTGBD2LP73	KTGBD4TP73	KTGBD5BTP73	KTGBD4LP73	KTGBD6LP73	KTGBD5TTP73	KTGBD5TLP73	KTGBD5BLP73	KTGBD6TP73
Pre-Test 2	96.0	94.9	97.4	100.0	92.9	92.9	92.9	100.0	92.0	100.0
Calibration Optimizing 2	100.0	98.9	94.4	100.0	100.0	100.0	96.2	96.0	95.7	100.0
Functional Test 2	90.6	94.6	87.9	73.3	100.0	91.3	80.0	83.3	76.2	81.3
Final Test 2	98.9	100.0	96.6	100.0	100.0	100.0	100.0	100.0	100.0	87.5
Composite Yield	86.0	88.8	78.1	73.3	92.9	84.8	71.5	80.0	67.1	71.1

- Grenada Classic 1TB Yield runs between 85%-89% **BP PCO 7.3 86%-88%**
- Grenada Classic 2TB Yield runs between 78-85% **BP PCO 7.3 78%-92%**
- Grenada Classic 2TB 5Hd Yield runs between 70-79% **BP PCO 7.3 71.5-80.0%**
- Grenada Classic 3TB Yield runs between 70-80% **BP PCO 7.3 71.1%-84.8%**

Factory Results, RGA to follow, MD still completing test! BP has additional instable/degraded head screens. Net net BP I slightly better yields at this point. Please look at YIP included for the next code. Additional actions will be added as mass production begins.

PCO7.3 Change Detail:

List of changes from PCO7.1 to PCO7.3

- GPG0 SF3 code w/ mini serpent support (Check)
- New SIC code 437873 (Check)
- HDSTRNEXTRUN= FIN2 instead of HDSTNEXTRUN=CRT2 (Check)
- Enable_DST_LONG and DUAL_STAGE_ACT_CHK when RECONFIG (Check)

Andrew Mention:

Two key things to notice:

1. We introduced new F3 build targets: **GPG0** and **GPG1** for supporting Media Cache with Mini-Serpent. This is a performance improvement (a response to Apple qualification) that we are cutting in across on Grenada BP going forward.
 - This creates a format *incompatibility* with existing GPF0, GPF1, GPF2 drives.
 - New tab and new SBS code will be released. In the meanwhile, please continue to process and ship SBS with PCO 6.2 until demand transitions.
 - New codes will also be released for Disti and Std OEM early next week for align this format update for CTU Declare / SAD.
2. Change new SF3 code GPG0 SF3 code w/ mini serpent support at FNC2 in order to fix seeding issue at FPW at FIN2 of PCO7.1

PCO7.3 Check Out Summary:

Product	Header	PCO	Test Time Compare		New EC	Consluded
			Marfest	PCO7.1		
BP	2H	7.3	Meet	less than ~2.8 Hrs	n/a	

Product	Header	PCO	Test Time		New EC	Consluded
			Marfest	PCO7.1		
BP	4H	7.3	Meet	less than ~5.4 Hrs	n/a	

Product	Header	PCO	Test Time		New EC	Consluded
			Marfest	PCO7.1		
BP	5H(TOP)	7.3	Meet	less than ~4.5 Hrs	New EC42174 at PRE2 (1/27)	
BP	5H(BOTTOM)	7.3	Meet	less than ~3.8 Hrs	n/a	

Executive Summary

- 2HD: No abnormality excursion EC. Test time reduce from PCO7.1 around 2.8 hrs.
- 4HD: No abnormality excursion EC. Test time reduce from PCO7.1 around 5.4 hrs.
- 5HD TOP: Observation EC42174 at PRE2 (1 / 27). Test time reduce from PCO7.1 around 4.5 hrs.
- 5HD BOTTOM: No abnormality excursion EC. Test time reduce from PCO7.1 around 3.8 hrs.
- 6HD : On testing.

Highlight

- New F3 build targets: GPG0 and GPG1 for supporting Media Cache with Mini-Serpent in PCO7.1 that can run only *tab-999*. Anyway, PCO7.3 was still same code that support only one as *tab -999* not support for disty *tab-300* as well.
- Test time PCO7.3 less than PCO7.1 around 3 – 5 hrs. due to the state CHK_MRG_G2 at FIN2. Both PCOs have the same sequential states but test time of CHK_MRG_G2 of PCO7.1 is higher than PCO7.3.
- Observation EC42174 at PRE2 (1 / 27) on 5H TOP configuration. On log file observed “ P_FAULT: FAULT_MESSAGE_SOURCE FAULT_CODE FAULT_MESSAGE - FIRMWARE 42174 FW-Prism Xfr Function Measurement Error” =>Non Article relate [Benjawan T.]

Conclusion

- PCO7.3 support only engineering Tap 999 not support for other Tap.

PC07.3 Drive parametric:

2H	
Parametric	PC07.3 vs PC07.1
P135_RD_CNTCT_DAC	Comparable
P135_WRT_CNTCT_DAC	Comparable
P109_UNVFYD_ERRS	Comparable
P109_VFYD_ERRS	Lower
RRAW_BER	Comparable
SSER	Comparable
P_DRV_ADC	Comparable
P_Actual_BPI_Margin	Comparable
P_Actual_TPI_Margin	Comparable

4H	
Parametric	PC07.3 vs PC07.1
P135_RD_CNTCT_DAC	Comparable
P135_WRT_CNTCT_DAC	Comparable
P109_UNVFYD_ERRS	Lower
P109_VFYD_ERRS	Lower
RRAW_BER	Comparable
SSER	Higher
P_DRV_ADC	Comparable
P_Actual_BPI_Margin	Comparable
P_Actual_TPI_Margin	Comparable

5H+Top	
Parametric	PC07.3 vs PC07.1
P135_RD_CNTCT_DAC	Comparable
P135_WRT_CNTCT_DAC	Comparable
P109_UNVFYD_ERRS	Lower
P109_VFYD_ERRS	Lower
RRAW_BER	Comparable
SSER	Higher
P_DRV_ADC	Comparable
P_Actual_BPI_Margin	Comparable
P_Actual_TPI_Margin	Comparable

5H+Bottom	
Parametric	PC07.3 vs PC07.1
P135_RD_CNTCT_DAC	Comparable
P135_WRT_CNTCT_DAC	Comparable
P109_UNVFYD_ERRS	Lower
P109_VFYD_ERRS	Lower
RRAW_BER	Comparable
SSER	Higher
P_DRV_ADC	Comparable
P_Actual_BPI_Margin	Comparable
P_Actual_TPI_Margin	Comparable

Site	Korat	Wuxi	Suzhou	MAR Fcst Q4'12
Prime yield	Output Yld	Output Yld	Output Yld	
Mass pro				
2H 500GB	85.9	85.2	87.2	90.0
2H 1.0TB	86.0	89.6	89.1	89.0
4H 2.0TB	81.2	85.0	81.1	78.0
5H 2.0TB (BtC)	79.7	75.2	77.8	80.0
6H 3.0TB	76.0	82.9	64.7	73.0
3T-2T WTF Ratio	4.8	2.0	1.2	
TK Test time	SP	IP	Total	Q4'12
PCO17.7D/E				
2H 500GB	26.7	6.4	33.1	41.0
2H 1.0TB	31.6	6.8	38.4	41.0
4H 2.0TB	61.8	10.2	72.0	75.0
5H 2.0TB (BtC)	73.1	10.5	83.6	92.0
6H 3.0TB	87.7	12.5	100.2	114.0
Quality				
ODT DPPM	2268	744	1398	< 2K
	SBS	Disty	OEM	
ORT AFR(%)	1.07%	2.32%	1.63%	1.00%

Program Highlights (FW1248)

1. Program schedule / PCO status : Cut-in PCO17.7D on Apr 26. PCO17.7E (GHG2 EC11049 fix + T25 LUL TTR on 500G) RGA completed. Pending re-validate on GHG2. Temporary cut-in PCO17.7D_47kHz for 500G Disty on MAY25. Next improvement will be in PCO17.9 (Under Checkout) . Already requested PCO17.7F to LCO (PCO17.7E+T180 screen for 18kHz Mod + Combined FIN2&CUT2 for IOTTR 30min). Pending LCO decision.

2.Yield

- 1TB/2H Mass Pro :** 3.0% **KOR** yield gap to budget. **KOR** 0.8% impact from S6 loading ratio increase to 30% (baseline 20%), 1.2% impacted from low bin media evaluation (GRATS2H0169, GRATS2H0167), and 1.0% EC10427, EC11049 from GRATS2H122A (Media G8.5L RGA FA is ongoing).
- 2TB/4H Mass Pro :** 3 sites are all above budget. No issue. **KOR** 1.6% impacted low bin media evaluation (GRATS4H0127, GRATS4H0125) with 100% non SLT05 wafer. **SZ** 1.9% impact from SLT05 affected wafer, loading ratio 12% with 70.4% yield. Note that volume of non SLT05 affected wafer are 100% **KOR&WX**, but 88% **SZ**.
- 2TB/5H Mass Pro :** 0.3% **KOR**, 4.8% **WX**, and 2.2% **SZ** yield gap to budget. **WX** Test quantity 1.8k, with 100% using HGA vender "0" (Uncontrolled of SLT05 wafer). **SZ** 1.4% impacted from SLT05 affected wafer, loading ratio 30% with 73.4% yield. Current 80% budget will be change to 78% on JunBud.
- 3TB/6H Mass Pro :** 8.3% **SZ** yield gap to budget. **KOR** 1.4% high WTF ratio from 2 media low bin evaluation (GRATS6H0128, GRATS6H0126) WTF = 28% (vs 0.9% Others). **SZ** 14.1% EC14774, EC14776, EC14782, EC14781 Unable to downgrade issue. The problem is from auto downgrade was turn off. Non SLT05 affected wafer are 100% of volumes for 3 sites.

3. Test time : PCO17.7D Mass-pro can achieve Q3&Q4 budget. No issue. Cut in 47kHz modulation screen removal on 500G Disty on May25. Saving 1hr/surf.

4. LODT: 7 day moving average LODT has been trigger > 2k Dppm. Main excursion from 2D NMD Type3, the symptom of failures is ding/dent on media at DSP area, specified only surface2 (bottom surface on top disc). Suspect MBA pad high get low spec cause of DSP pin hit to base plate and make till up after install screw. Action 1) MQM DSP screen at IO for FG (Plan to validate 3k drives on 2TB/4H) ECD JUN'04. 2) Stop JCY DSP and switch to use Altum supplier (MAY 24). 3) To use new DSP with Pin C removal and rework DSP by shorten Pin C. Validation is in progress.

Test Time PCO7.3 Check Out

							TT(hrs)			Marfest Q4'12 BP	
2H	PRE2	CAL2	FNC2	CRT2	FIN2	CUT2	SP	IP	Overall	SP	IP
PCO17.5	4.72	2.45	23.33	1.45	0.68	4.01	30.51	6.15	36.65	34	9
PCO5.2(Mirror)	4.93	2.98	21.98	1.74	0.67	3.75	29.89	6.16	36.05		
PCO5.2-AMK	4.88	3.13	20.58	1.34	0.59	3.42	28.58	5.35	33.93		
PCO6.0-RGA	4.99	3.14	21.73	1.62	0.48	4.47	29.86	6.57	36.44		
PCO6.2-RGA	4.80	3.02	22.10	1.43	0.48	4.39	29.92	6.30	36.22		
PCO7.1-RGA	5.20	3.05	23.51	n/a	7.88	n/a	31.75	7.88	39.63		
PCO7.1	5.20	2.92	23.51	n/a	7.88	n/a	31.63	7.88	39.51		
PCO7.3 checkout	5.00	2.83	23.20	0.00	5.64	0.00	31.03	5.64	36.67		
PCO17.7D	4.80	2.65	24.12	1.58	0.86	4.41	31.57	6.85	38.42		

							TT(hrs)			Marfest Q4'12 BP	
4H	PRE2	CAL2	FNC2	CRT2	FIN2	CUT2	SP	IP	Overall	SP	IP
PCO17.5	7.77	4.64	41.52	1.95	0.74	6.42	53.93	9.11	63.03	65	12
PCO5.2(Mirror)	7.87	4.98	40.54	1.58	0.51	6.11	53.39	8.20	61.59		
PCO5.2-AMK	8.37	4.98	43.04	1.59	0.57	6.00	56.39	8.16	64.55		
PCO6.0-RGA	8.22	5.15	42.57	1.76	0.49	7.92	55.93	10.17	66.10		
PCO6.2-RGA	8.12	5.21	43.09	1.71	0.49	8.09	56.43	10.29	66.71		
PCO7.1-RGA	8.05	5.08	49.45	0.00	14.39	0.00	62.58	14.39	76.97		
PCO7.3 checkout	8.49	4.90	48.60	0.00	9.57	0.00	61.99	9.57	71.56		
PCO17.7D	7.73	4.86	45.56	1.90	1.04	7.28	58.15	10.22	68.37		

							TT(hrs)			Marfest Q4'12 BP	
5H	PRE2	CAL2	FNC2	CRT2	FIN2	CUT2	SP	IP	Overall	SP	IP
PCO17.5-Top	10.00	6.39	53.29	1.87	0.76	7.70	69.68	10.33	80.00	80	14
PCO17.5-Bottom	9.71	6.30	43.47	2.08	1.22	7.54	59.48	10.85	70.33		
PCO5.2(Mirror)-Top	9.97	6.61	56.95	1.73	0.52	6.88	73.54	9.13	82.67		
PCO5.2(Mirror)-Bottom	9.96	6.63	50.98	1.74	0.52	6.89	67.57	9.15	76.72		
PCO6.0 RGA-Top	10.05	6.78	50.81	1.85	0.50	9.03	67.65	11.38	79.02		
PCO6.0 RGA-Bottom	10.07	6.78	51.39	1.86	0.50	9.19	68.24	11.56	79.80		
PCO6.2 RGA-Top	9.93	6.68	52.60	2.04	0.50	8.97	69.21	11.51	80.73		
PCO6.2 RGA-Bottom	10.04	6.71	51.44	1.89	0.51	9.42	68.19	11.81	80.00		
PCO7.1 Top	10.30	6.77	52.76	0.00	15.23	0.00	69.83	15.23	85.06		
PCO7.1 Bottom	10.32	6.77	52.43	0.00	15.66	0.00	69.52	15.66	85.18		
PCO7.3 Top checkout	10.29	6.72	53.27	0.00	10.25	0.00	70.28	10.25	80.53		
PCO7.3 Bottom checkout	10.20	6.81	53.79	0.00	10.59	0.00	70.80	10.59	81.39		
PCO17.7D Top	9.36	6.66	56.12	1.86	0.63	7.38	72.14	9.87	82.01		
PCO17.7D Bottom	9.51	6.57	54.16	1.82	0.70	7.77	70.24	10.29	80.53		

Initial Evaluations:

- Fremont G9.1B (250B) and G9L (200L) evaluated in drive.
- Clear 4-5% ADC gain seen across the stroke and across head width distributions.
- Translates to ~ 0.15 decades BER gain.

Next Steps:

- RMO team is working to transfer the designs to Wlds and Kulim (for the ODM version).
- Priority established is G9L, followed by G9L ODM, followed by G9.1B.
- COC choice for the G9.1B is under determination (will be based on TMIC margin check).

Tentative Timeline:

- Wlds G9L replication for qualification drive builds – FW52.
- Qual start in FW02.
- Decision in FW05.
- Trigger RGAs in FW06.
- ODM disc will lag G9L by 2 weeks – RGAs in FW08.
- Wlds G9.1B will lag the Wlds G9L by 4 weeks – RGAs in FW10.

Yield improvement activities

❖ Using PCO 7.1 RGA as the baseline

EC	% Improvement			
	2H	4H	5H	6H
10414-Svo PES-RRO Out of Spec	0.58	0.41	1.2	2.62
14925-Delta DAC Exceeded		0.42	0.77	0.4
14841-Too Few Data Points for Final Fit	0.2		0.86	0.86
11049-Tester Timeout-Test Time Limit Exceeded	0.4	0.4	0.5	1
11224-Drv F/W-Max. gain correction exceeded			0.4	0.4
10289-Svo Cal-Max Gain Variation Too Large		0.4	0.4	0.4
10468-Drv Misc-Test Failed			0.4	
10446-Wt/Rd Def's-Slip Failure	2.2	1.5	2.2	1.7
14869-Too Many Measured Outliers	0.3	2	0.4	0.6
48409-P240_Eaw_Error_Rate Fail	0.4	0.9	1.9	0.6
14006-Iface SATA - Wait for BUSY	0.2	0.5	1.3	1
TOTAL:	4.28	6.53	10.33	9.58
11049 : T501 Fallouts	1.5	13	7.5	11.6
12657-Proc Final - CUT Seq DMA Write Error				

These are failure modes LCO and Korat teams are working on.

PCO 7.1. I/O slots excursion – Mini-Serpent related fixed in PCO 7.3

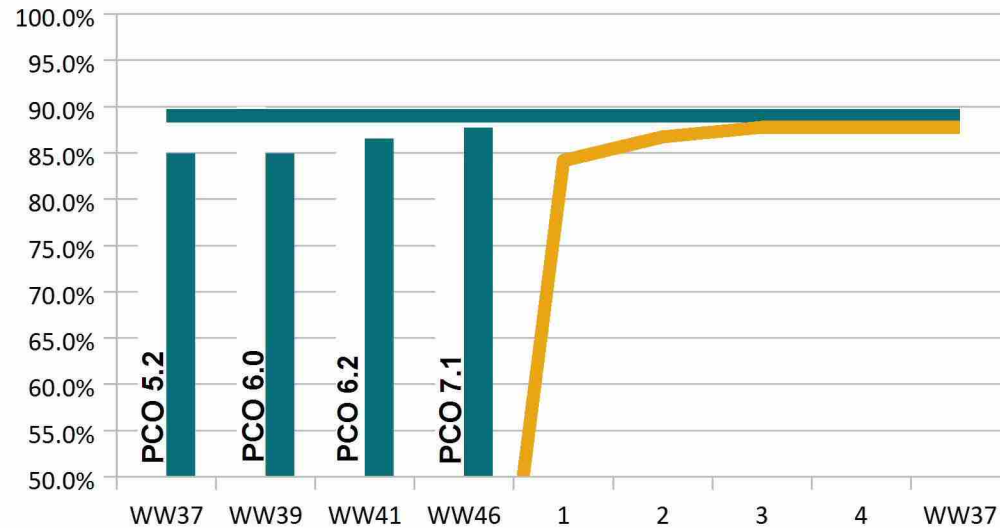
Grenada BP 1T Actual Output Yield

■ Grenada Classic 1T Actual Output Yield

■ LRP Grenada BP 1T Budget

■ Classic Projected Yield

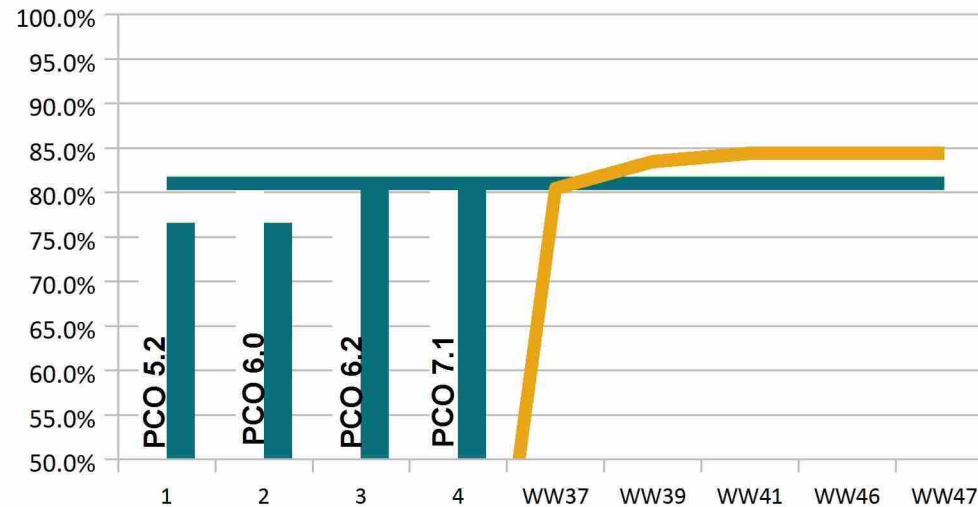
■ Grenada BP 1T Projected Yield



Grenada 1T Yield Improvement Plan	Improvement	RGA Fallout	WW37	WW39	WW41	WW46	WW47	WW50	WW04	WW05	WW06
								PCO 8.0			
FC 10414 - Add Retry in T193 CHROME w/ Gain Doubled	0.20%	0.50%						0.20%			
FC 11049; DFS Timeout Fix	0.25%	0.50%						0.25%			
FC 48409; Apply EAW Failure Specs after 1M Writes	0.05%	0.20%						0.05%			
FC 11049; Increase T109 and T130 Timeout	0.10%	0.25%						0.10%			
AFH 37.0	0.50%	2.00%						0.50%			
FC 14869; ATS Seek Servo Fix	0.20%	0.42%						0.20%			
Write Triplets by Zone	0.25%							0.25%			
FC 10446; Reduce TA Tripad Padding	1.00%	2.50%						1.00%			
FC 11049; ATI Test Hang Fix	0.00%	0.00%						0.00%			
FC 48431; Remove Avg Iteration Spec from T250 BER Test	0.00%	0.00%						0.00%			
RHO Head Instability Screens	1.00%	4.00%							1.00%		
Total YIP IMP								2.55%	1.00%	0.00%	0.00%
Grenada BP 1T Actual Output Yield			85.5%	90.0%	89.7%	84.2%					
Grenada Classic 1T Actual Output Yield			84.9%	84.9%	86.5%	87.7%					
LRP Grenada BP 1T Budget			89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
Grenada BP 1T Projected Yield											

Grenada BP 2T Actual Output Yield

- Grenada 2T Classic Output Yield
- LRP Grenada BP 2T Budget
- Classic 2T Projected Yield
- Grenada BP 2T Projected Yield



Grenada 2T Yield Improvement Plan	Improvement	RGA Fallout	WW37	WW39	WW41	WW46	WW47	WW50	WW04	WW05	WW06
PCO Release								PCO 8.0			
EC 10414 - Add Retry in T193 CHROME w/ Gain Doubled	0.10%	0.20%						0.10%			
FC 11049; DFS Timeout Fix	0.25%	1.00%						0.25%			
FC 48409; Apply EAW Failure Specs after 1M Writes	0.25%	0.80%						0.25%			
Increase T109 and T130 Timeout	0.10%	0.25%						0.10%			
AFH 37.0	0.50%	1.50%						0.50%			
EC 14869; ATS Seek Servo Fix	0.50%	1.00%						0.50%			
Write Triplets by Zone	0.25%							0.25%			
FC 10446; Reduce TA Tripad Padding	1.00%	1.50%						1.00%			
EC 11049; ATI Test Hang Fix	0.00%	0.00%						0.00%			
FC 48431; Remove Avg Iteration Spec from T250 BER Test	0.00%	0.00%						0.00%			
RHO Head Instability Screens	1.00%	2.00%							1.00%		
Total YIP IMP			0.00%	0.00%	0.00%	0.00%	0.00%	2.95%	1.00%	0.00%	0.00%
Grenada BP 2T Actual Output Yield			79.4%	84.0%	77.9%	80.5%					
Grenada 2T Classic Output Yield			76.6%	76.6%	80.9%	80.5%					
LRP Grenada BP 2T Budget			81.0%	81.0%	81.0%	81.0%	81.0%	81.0%	81.0%	81.0%	81.0%

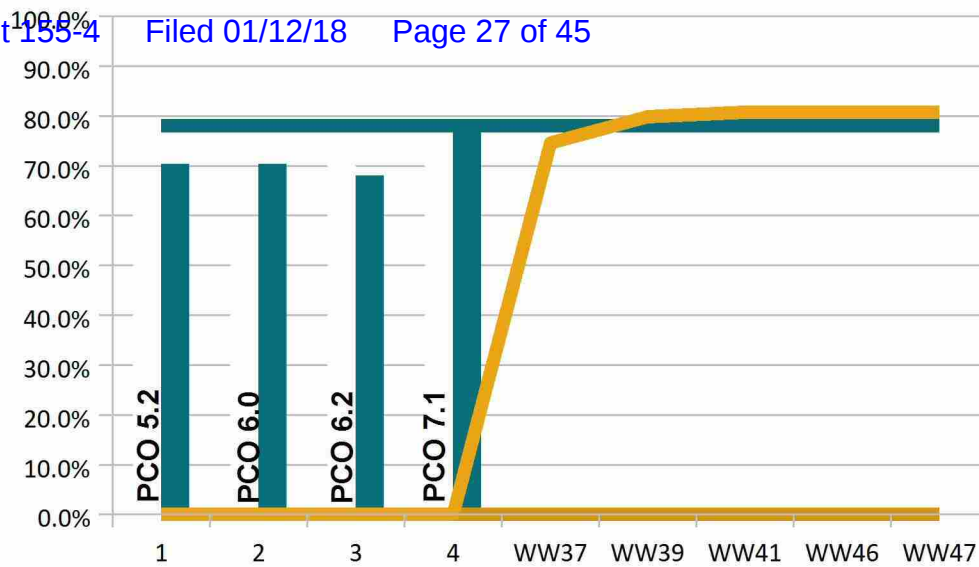
- Grenada BP 2T btc Actual Output Yield
- Grenada Classic 2T btc Actual Output Yield
- LRP Grenada BP 2T btc Budget
- Grenada BP 2T btc Projected Yield



Grenada 2T btc Yield Improvement Plan	Improvement	RGA fallout	WW37	WW41	WW46	WW47	WW48	WW49	WW50	WW04	WW05	WW06
PCO Release									PCO 8.0			
EC 10414 - Add Retry in T193 CHROME w/ Gain Doubled	0.50%	1.20%							0.50%			
FC 11049; DFS Timeout Fix	0.05%	0.10%							0.10%			
FC 48409; Apply EAW Failure Specs after 1M Writes	0.25%	1.50%							0.25%			
Increase T109 and T130 Timeout	0.05%	0.10%							0.05%			
AFH 37.0	0.50%	1.50%							0.50%			
EC 14869; ATS Seek Servo Fix	0.00%	0.00%							0.00%			
Write Triplets by Zone	0.25%								0.25%			
FC 10446; Reduce TA Tripad Padding	1.00%	2.50%							1.00%			
EC 11049; ATI Test Hang Fix	0.00%	0.00%							0.00%			
FC 48431; Remove Avg Iteration Spec from T250 BER Test	0.00%	0.00%							0.00%			
RHO Head Instability Screens	2.00%	10.00%								1.00%		
Total YIP IMP			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.65%	1.00%	0.00%	0.00%
Grenada BP 2T btc Actual Output Yield			71.8%	72.5%	72.6%							
Grenada Classic 2T btc Actual Output Yield			73.2%	75.9%	78.5%							
LRP Grenada BP 2T btc Budget			81.0%	81.0%	81.0%	81.0%	81.0%	81.0%	81.0%	81.0%	81.0%	81.0%
Grenada BP 2T btc Projected Yield						73%	73%	73%	75%	76%	76%	76%
						0.40%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%

Grenada BP 2T Actual Output Yield

- Grenada 2T Classic Output Yield
- LRP Grenada BP 2T Budget
- Classic 2T Projected Yield
- Grenada BP 2T Projected Yield



Grenada 2T Yield Improvement Plan	Improvement	RGA Fallout	WW37	WW39	WW41	WW46	WW47	WW50	WW04	WW05	WW06
PCO Release								PCO 8.0			
EC 10414 - Add Retry in T193 CHROME w/ Gain Doubled	0.01	2.50%						1.25%			
FC 11049; DFS Timeout Fix	0.02	3.00%						1.50%			
FC 48409; Apply EAW Failure Specs after 1M Writes	0.00	0.50%						0.10%			
Increase T109 and T130 Timeout	0.00	0.50%						0.10%			
AFH 37.0	0.01	1.25%						0.50%			
EC 14869; ATS Seek Servo Fix	0.00	0.50%						0.25%			
Write Triplets by Zone	0.50							0.50%			
FC 10446; Reduce TA Tripad Padding	1.00	2.50%						1.00%			
EC 11049; ATI Test Hang Fix	0.00	0.00%						0.00%			
FC 48431; Remove Avg Iteration Spec from T250 BER Test	0.00	0.00%						0.00%			
RHO Head Instability Screens	1.00	4.00%							1.00%		
Total YIP IMP			0.00%	0.00%	0.00%	0.00%	0.00%	5.20%	1.00%	0.00%	0.00%
Grenada BP 2T Actual Output Yield			69.0%	56.6%	71.8%	74.6%					
Grenada 2T Classic Output Yield			70.4%	70.4%	68.0%	78.2%					
LRP Grenada BP 2T Budget			78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%

F3 Code ECR Released

GrenadaBP MC, Apple and Lenovo code AA3P00 code sent to DOC Control

1) GPG17x.CCD4.AA3P00.CC43 with x7E5 servo (MC Disty/STD OEM)

REL--0187469

1D: 100709060

2D: 100709058

3D: 100709061

2) GPG07x.APD1.AA3P00.AP13 with x7E5 servo (Apple)

REL-0187471

1D: 100709056

2D: 100709055

3D: 100709057

3) GPG17x.CCD6.AA3P00.CC65 with x7E5 servo (Lenovo)

REL-0187473

1D: 100709053

2D: 100709052

3D: 100709054



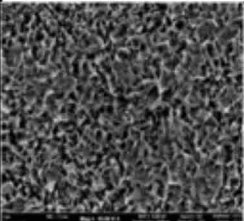
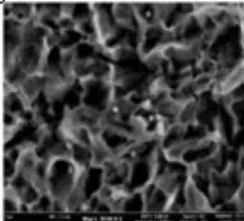
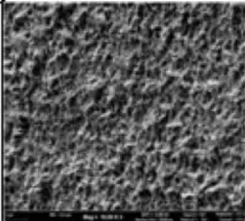
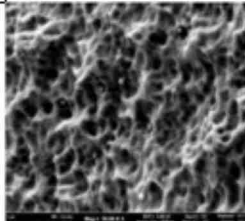
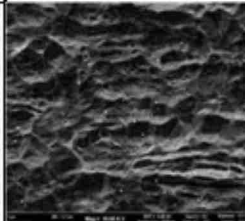
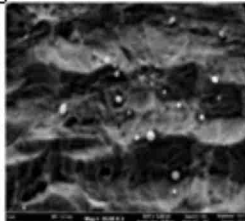
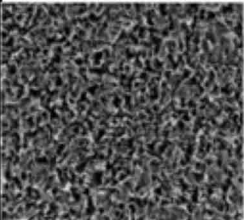
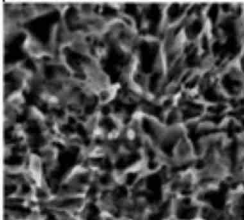
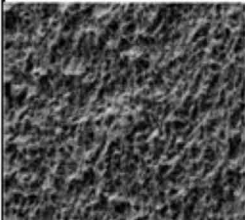
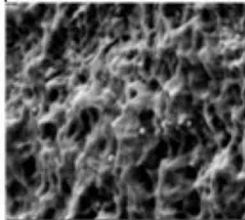
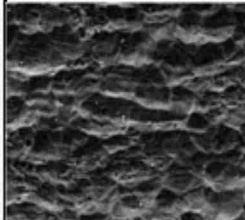
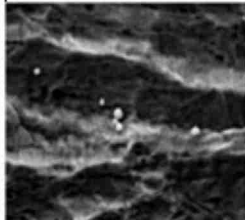
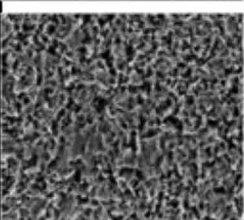
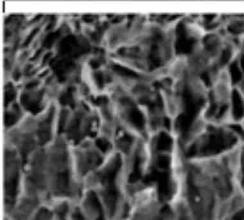
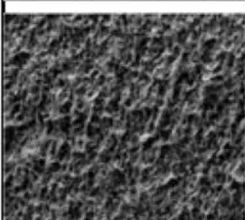
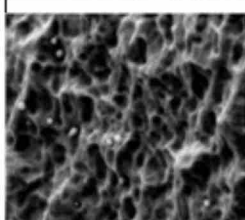
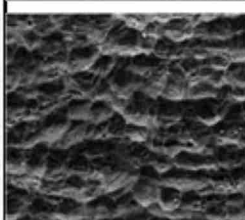
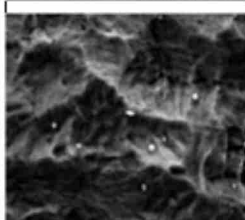
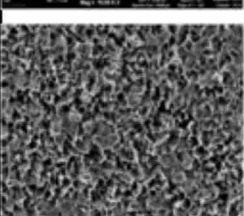
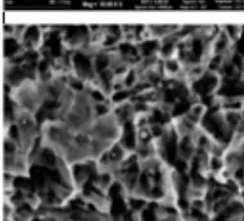
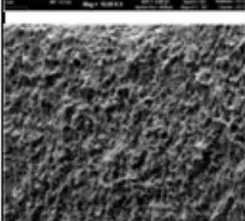
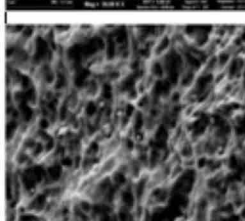
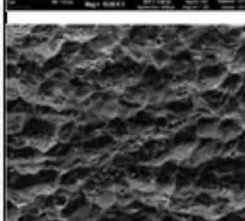
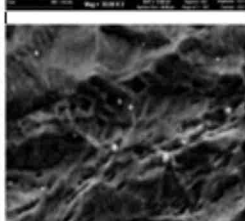

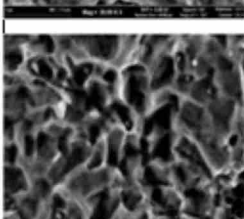
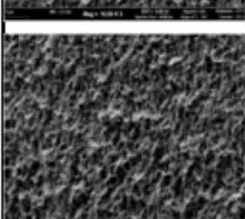
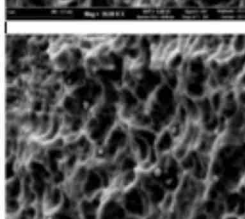
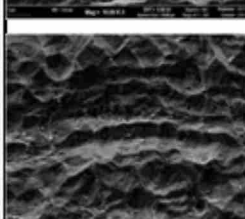
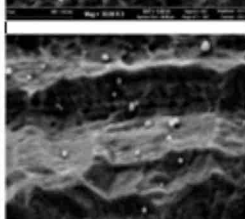






Issue: *NHK Higher ORT NMD Failure Rate than MPT*

Issue	Impact
Drives built with NHK TGA's show a 2x – 4x higher for programs ORT NMD DPPM than drives built with MPT.	Potential long term degraded reliability performance
Critical Data	Critical Interim Tasks
<ul style="list-style-type: none">Compass (NHK) has a higher ODT particle failure rate than MPTCompass (and Mantaray) are the only two Iris programs to use a post-plated baseplates (Au plating after stamping)Due to high particle failure rates in late CY 2011, the TCO Compass program switched base plate SST supplier from NMI to 100% NSSC (as of FW23 '12), with a 95% fix effectiveness (Valkyrie is the only other (NHK) program using NSSC SSTNHK Grenada TGA's use OSK baseplate made with NMI SST and MPT TGA's use IPT baseplates made a U.S. domestic SST.Suzhou analysis indicated that MPT Compass & Grenada loadbeams had smoother etched 'edges' than NHK, which looked honeycombed, and the NHK loadbeams had higher CrC inclusion ratesStandard outgoing contamination performance shows NHK LPC, SST, PZT & MgSiO counts lower than MPT, with HPA comparable	<ul style="list-style-type: none">Validate Root Cause being TGA Baseplate via baseplate (BP) swap build of 4x 15k drives<ul style="list-style-type: none">30K sets each of MPT/MPT BP (control), MPT/NHK BP (eval), NHK/NHK BP (control), NHK/MPT BP (eval) ordered. Delivery Done FW47HGSA build – Done FW48 / Drive build – ECD FW49 / Drive Test – ECD FW02Request LCO to validate that the ORT differences ONLY track with the TGA and that no other component (supplier) 'correlate' with the higher ORT failure rates. Hari N. ECD FW44 Done<ul style="list-style-type: none">7k x 8 config matrix to be run (KPIV's: Slider site, TGA vendor & Drive site). Magneson / Dietz – TGA @ STX - FW47 Done, HGA Build - ECD FW48, HSA Build ECD FW49, Drive Build & Test - ECD FW52Determine the feasibility of a NHK (OSK) baseplate from NMI to NSSC SST supplier change.NHK confirmed NSSC lead time is ~2 months for 100% cut-inWaiting for NRM CMT to confirm (Floeder) – ECD FW44 DoneTGA Load Beam Edge etching optimization<ul style="list-style-type: none">DNP (sub-supplier) will add post-treatment after current etched process; Feasible evaluation showed Condition B appears better / smoother Done FW46 . Condition B shows smoother edge but Cr/C still remainingImplement L/B post treatment - DNP Equipment lead time 3 monthsDNP Iris is using different re-roller (DNP – Toyo; MPT/HTI – NSMat) DNP Cadmium LB (rolled by NSMat) showing only few Cr/C particles and good. NHK to confirm with more direct SEM images. ECD 5/31Other: RFI sent to all TGA suppliers asking about feasibility of EN / Electrolytic Ni plating the loadbeam edge (or entire loadbeam) after etching prior to resist stripping - Done FW47<ul style="list-style-type: none">SE / DE CMT to review supplier feedback and determine path forward - ECD FW 48 / 49

- **TGA 'Load Beam' Edge C/A**
 - Sub-Assembly Level U/S Cleaning (Done 5/15)
 - Removal of some loose Cr/C particles (17%)
 - DNP (Dai Nippon Printing) Additional Post Treatment Process – TBD
 - Condition B shows smoother edge but Cr/C still remaining
 - P re-roller change from Toyo to NSMat (NSSC sister company) - TBD
 - Expected to match with MPT and HTI Cr/C particle amount
- **Pre-Plate 'Baseplate' C/A**
 - Sub-Assembly Level U/S Cleaning (Done 5/15)
 - removal of some loose oxide particles (30%)
 - Raw material change from NMI to NSSC (cleaner steel) - TBD
 - Removal of some loose SiO particles on boss hub ID (almost 100%)

TGA Load Beam Edge C/A (All Programs)

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Sample	Current		Condition A		Condition B	
Magnification	x10k	x30k	x10k	x30k	x10k	x30k
LB edge						
						
						
						
						
						

Issue	Impact										
<ul style="list-style-type: none"> ODT Failures (NMD Type 3 on surface 2) with root cause <u>interference between Pad C pin and base casting</u> 	<ul style="list-style-type: none"> Factory on Stop 										
Body of Facts	Critical Actions Dates / Owners										
<ul style="list-style-type: none"> Mass pro DSP is p/n 100621593, was released in 2010, and has been in use since early Gen development phases. This is a leveraged part from Trinidad / Bogart. This DSP has 0.048" long locating pins. (7- 8 million parts WIP) With current dims and tolerances, potential for significant pin interference with base casting (several thousandths of an inch). This contact acts as fulcrum point and pushes DSP tip upward (toward surface 2). Primary tolerance contributor is z-height of cast elevation on base. Factory reports that all ODT fails measured have high casting elevation. Pad C Pin not critical for functionality, and not believed to be critical to FOF assembly either. Grenada migration plan is DSP p/n 100694007, which has Pad C pin removed. Factory is running a 800 piece rabbit run to validate no issues. 	<p><u>Short Term:</u></p> <table> <tr> <td>Method to manually trim pad C pin</td><td></td></tr> <tr> <td>Manual Trim of 25 test pieces</td><td>DONE</td></tr> <tr> <td>FOF cleaning of test parts vs. controls</td><td>5-30</td></tr> <tr> <td>Cleanliness Comparison (LPC)</td><td>6-1</td></tr> <tr> <td>DSP metrology Comparison</td><td>6-2</td></tr> </table> <p>VENDOR STOP BUILD OF EXISTING ASAP</p> <p>DA: remove Pad C pin, 100621593 & 100678736 5-29</p> <p>MBA screen: LAT review [SQE] 5-30</p> <p>Blade tip distortion vs. interference study 5-29</p> <p><u>Long Term:</u></p> <p>RGA & Implementation of p/n 100694007</p> <p><i>(need to issue DA for Disty ship of GRATS6H0139)</i></p>	Method to manually trim pad C pin		Manual Trim of 25 test pieces	DONE	FOF cleaning of test parts vs. controls	5-30	Cleanliness Comparison (LPC)	6-1	DSP metrology Comparison	6-2
Method to manually trim pad C pin											
Manual Trim of 25 test pieces	DONE										
FOF cleaning of test parts vs. controls	5-30										
Cleanliness Comparison (LPC)	6-1										
DSP metrology Comparison	6-2										

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Section A-A

Figure 10 shows a cross-section of the dental prosthesis assembly. A yellow layer, labeled "DSP wrapped and stream touch media", is visible on the left. A gap between this layer and the metal base is indicated by a red dashed oval and labeled "Gap between DSP and MDA".

RDT 3.0 Desktop MTBF/FE

Grenada BP RDT 3.0 MTBF/FE Table					Updated: 5/14/12 12:00 AM				
AFR (1st year Weibull)	2.917%	From all fails Weibull MLE			1068	QTY_TESTED			
MTBF (1st year Weibull)	81056.4								
Minimum AFR:	0.050%	From zero fail Weibull @ 50% CL			2400	POH/Year			
Total Number of Failures	36				0.4756772	Weibull Beta			
AFR for 1 failure	0.080%	AFR decrease per failure @ 100% fix effectiveness			1009	Average Test Hours			
Issue	Corrective Action	Fix Validation	# of Failures	% Fail	Eff. Factors		Reduced AFR		PFL/TTF
					Demo'd	Potential	Demo'd	Potential	
Command Completion Timeout EC 805	CA: SID CLK set to 700MHz		13	1.036%	100%	100%	1.882%	1.882%	SUZ-7461/170,SUZ-7463/116,SUZ-7462/276,SUZ-7464/106,SUZ-7542/238,SUZ-7543/83,SUZ-7441/86,SUZ-7442/83,SUZ-7541/201,SUZ-7701/261,SUZ-6451/40,SUZ-8143/183,SUZ-7702/262
New Defect (NHK)	NHK CA (Remove) from GRN BP ww44		5	0.398%	40%	100%	2.758%	2.519%	SUZ-6982/118,SUZ-6981/122,SUZ-7681/312,SUZ-9285/660,SUZ-6622/108
Head Instability	Pulse Plating Bath/HMR 9.7B ww46		5	0.398%	80%	80%	2.599%	2.599%	SUZ-6621/72,SUZ-8145/353,SUZ-9283/773,SUZ-8144/356,SUZ-9027/667
Can Not Duplicate	Possible Head Instability-Pulse Plating Bath/HMR 9.7B ww46		3	0.239%	0%	80%	2.917%	2.726%	LCO-7821/370,SUZ-8344/476,SUZ-9721/845
Bad Write with LSI Preamp	03/27 CA (potential) Classic's stress opti (Opti20.2) PCO 7.0 ww45		2	0.159%	95%	100%	2.766%	2.758%	SUZ-6721/114,SUZ-6452/53
Bad Write with TI Preamp	CA: new write triplets and write-current backoff at hot (62-63°C)		2	0.159%	95%	100%	2.766%	2.758%	LCO-6681/6,LCO-6367/16
Skip Write	Both MPT		2	0.159%	0%	0%	2.917%	2.917%	SUZ-7421/278,SUZ-9284/764
New Defect (MPT)			1		0%	50%			SUZ-6601/86
Faulty servo controller chip (Dillon)	ESD Damage per SiT Micro. Luxor Plus running at higher clock rate- over current		1	0.080%	50%	100%	2.878%	2.838%	LCO-6967/0
Fly Height Modulation, Write			1	0.080%	0%	0%	2.917%	2.917%	SUZ-6453/25
SLT 05 Plating Bath	ISI shows high asymmetry -- CA: heater ON in ISI testing starting WW43		1	0.080%	100%	100%	2.838%	2.838%	SUZ-6448/35
Total Number of Fails			36		Reduced AFR :		0.98%	0.50%	
					Corresponding MTBF :		243K	482K	

- Head Instability 5/5 243K



Grenada BP RDT 3.0 Desktop 168hr DPPM

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Grenada BP RDT 3.0 MTBF/FE Table

Updated: 5/14/12 12:00 AM

168hr DPPM 16,854

Total Number of Failures 18

1009

Average Test Hours

Issue	Corrective Action	Fix Validation	# of Failures	% Fail Attributed to DPPM	Fix Eff Factors		DPPM Reduced by		PFL/TTF
					Demo'd	Potential	Demo'd	Potential	
Command Completion Timeout EC 805	CA: SID CLK set to 700MHz		6	33.333%	100%	100%	5617.98	5617.98	SUZ-7463/116,SUZ-7464/106,SUZ-7543/83,SUZ-7441/86,SUZ-7442/83,SUZ-6451/40
New Defect	NHK CA (Remove) from GRN BP ww44		4	22.222%	30%	100%	1123.60	3745.32	SUZ-6982/118,SUZ-6981/122,SUZ-6601/86,SUZ-6622/108
Bad Write with LSI Preamp	03/27 CA (potential) Classic's stress opti (Opti19.5)		2	11.111%	95%	100%	1779.03	1872.66	SUZ-6721/114,SUZ-6452/53
Bad Write with TI Preamp	CA: new write triplets and write-current backoff at hot (62-63°C)		2	11.111%	95%	100%	1779.03	1872.66	LCO-6681/6,LCO-6367/16
Faulty servo controller chip (Dillon)	ESD Damage per StT Micro		1	5.556%	50%	100%	468.16	936.33	LCO-6967/0
Fly Height Modulation, Write			1	5.556%	0%	0%	0.00	0.00	SUZ-6453/25
Head Instability	Pulse Plating Bath/HMR 9.7B ww46		1	5.556%	80%	100%	749.06	936.33	SUZ-6621/72
SLT 05 Plating Bath	ISI shows high asymmetry -- CA: heater ON in ISI testing starting WW43		1	5.556%	100%	100%	936.33	936.33	SUZ-6448/35
Total Number of Fails			18	DPPM Reduced To :			4,401	936	

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Grenada Classic ORT

Updated: 6-4-12 12:00 AM

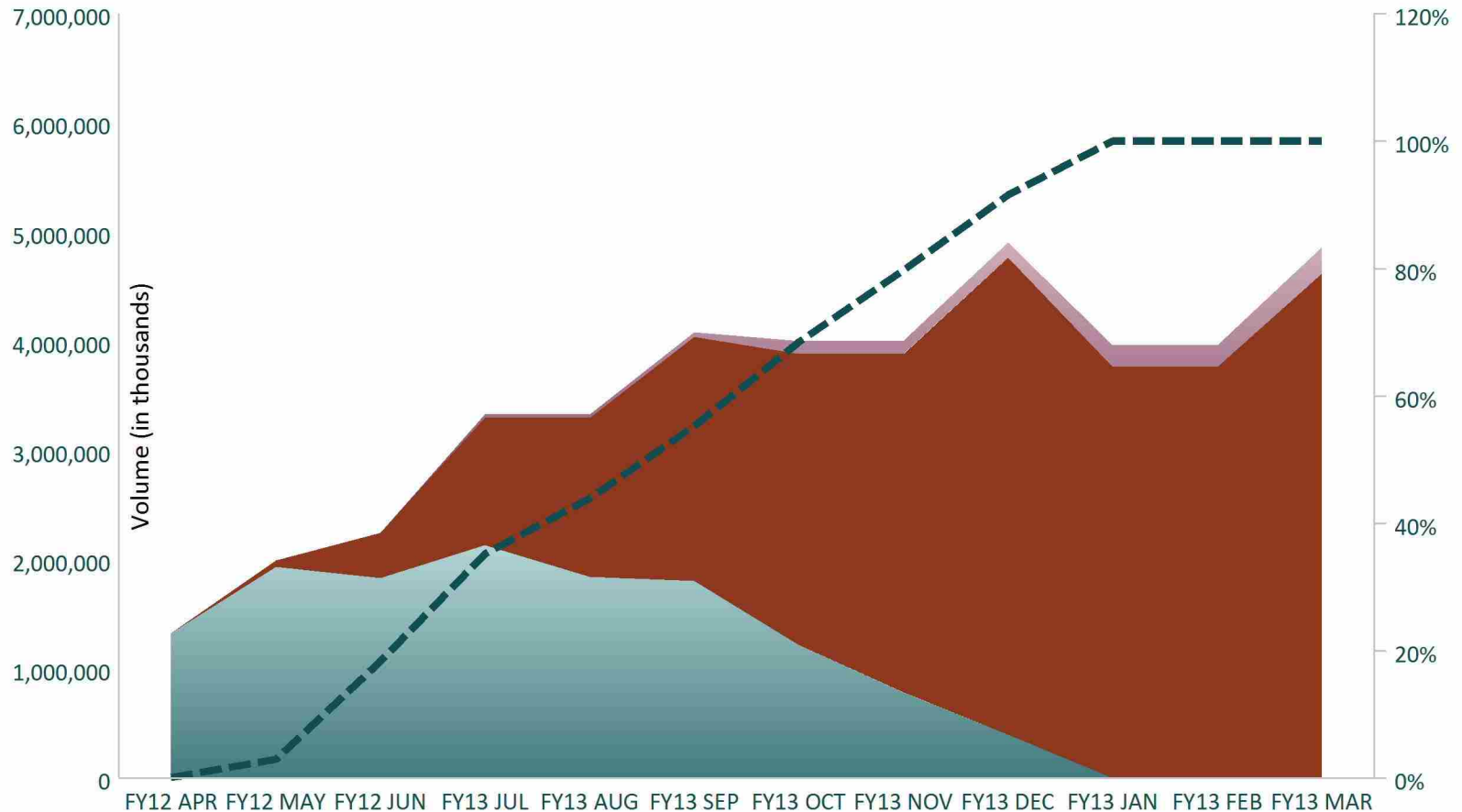
AFR (1st year Weibull)	3.436%	From all fails w/ Weibull MLE	No_Info	QTY_TESTED
MTBF (1st year Weibull)	68645.4			
Minimum AFR:	0.021%	From zero fail Weibull @ 50% CL	2400	POH/Year
Total Number of Failures	81		0.506781	Weibull Beta
AFR for 1 failure	0.042%	AFR decrease per failure @ 100% fix effectiveness	535	Average Test Hours

Issue	Corrective Action	Fix Validation	# of Failures	% Fail	Eff. Factors		Reduced AFR		PFL/TTF
					Demo'd	Potential	Demo'd	Potential	
SPPL-167: NMD - Post SAD - NHK Suspension		Validation based on reducing the NHK loading to 30% through July.	10	0.422%	40%	70%	3.267%	3.141%	PFL-4266/530,PFL-4354/324,PFL-4271/52,PFL-4268/198,PFL-4217/531,PFL-4305/37,PFL-4148/642,PFL-4175/146,PFL-3896/143,PFL-4161/10
SPPL-121: CND retest pass!			6	0.253%	100%	100%	3.183%	3.183%	PFL-4118/23,PFL-3859/149,PFL-4147/294,PFL-3923/328,PFL-4119/263,PFL-3899/12
SPPL-157: Bad Write from LSI Preamp with PC017.x	PC017.7C with opti 19.5	PC017.7C fixes validated on 22 previous bad write failures in LCO	6	0.253%	95%	95%	3.196%	3.196%	PFL-4326/429,PFL-4325/436,PFL-4189/268,PFL-4218/28,PFL-4024/51,PFL-4176/28
SPPL-165: OEM Degrade/Unstable Head with old spec from Pre PC017.7C	PC017.7C Additional GDTF spec of SER for OEM only (Reli) --> SER > 3.16 in P109_DFS_BER_ID_STATS, Cut in w/W1243 100% heater turn on in ISI, cut in Penang cut in 100% on Mar-8, Korat Slider cut in Mar-14		5	0.211%	30%	80%	3.373%	3.267%	PFL-4238/395,PFL-4183/422,PFL-4144/94,PFL-4065/117,PFL-3838/84
Degraded Head			4	0.169%	0%	0%	3.436%	3.436%	PFL-4375/95,PFL-4355/315,PFL-4237/401,PFL-4249/125
DNR			4	0.169%	0%	0%	3.436%	3.436%	PFL-4269/117,PFL-4341/179,PFL-3824/28,PFL-3820/33
SPPL-154: Degraded-Unstable Head from NRM plating bath SLT_05	All affected material has been subjected to a tighter chunk qual spec at ISI (3.95 max for median Bark_Jmp) w/W35 GDTF Opportunity (PC017.5 - Cutin w/W35) Upstream ISHET Opportunity (w/W3	Grenada/Bacall/Classic/BP showing significant difference in SLT_05 Failure Rate. See PFL details.	4	0.169%	60%	80%	3.335%	3.301%	PFL-4054/164,PFL-4114/27,PFL-3860/160,PFL-3897/22
SPPL-160: Offtrack Write due to PZT Control Spike	A7 Servo Code	A7 Servo Code released on 4/3/2012	4	0.169%	70%	100%	3.318%	3.267%	PFL-3944/263,PFL-3825/33,PFL-4116/277,PFL-3886/112
SPPL-166: NMD - Post SAD - MPT Suspension	1. A7 servo code, cut in DOM1241	PFL-3943, PS Zipper, Head was generally clean. Fix in A7.	4	0.169%	0%	40%	3.436%	3.368%	PFL-4328/143,PFL-3943/382,PFL-4013/173,PFL-4135/51
SPPL-171: Dirty Degrade/Unstable Head with PC017.x	100% heater turn on in ISI, cut in Penang cut in 100% on Mar-8, Korat Slider cut in Mar-14.		4	0.169%	0%	80%	3.436%	3.301%	PFL-4025/35,PFL-4053/175,PFL-4023/149,PFL-3922/232
Spin-Up Timeout			3	0.126%	0%	0%	3.436%	3.436%	PFL-4360/828,PFL-4346/94,PFL-4339/240
SPPL-163: 18-20kHz Modulation - Post			3	0.126%	0%	0%	3.436%	3.436%	PFL-4115/33,PFL-3823/52,PFL-3898/0

Unclassified Failure			3	0.126%	0%	0%	3.436%	3.436%	PFL-4368/50,PFL-4361/38,PFL-4363/165
Hard Error CND			2	0.084%	0%	0%	3.436%	3.436%	PFL-4340/58,PFL-4173/23
NMD			2	0.084%	0%	0%	3.436%	3.436%	PFL-4362/28,PFL-4352/8
Skip Write			2	0.084%	0%	0%	3.436%	3.436%	PFL-4270/52,PFL-4322/278
Erase			1	0.042%	0%	0%	3.436%	3.436%	PFL-4330/10
Head Asymmetry			1	0.042%	0%	0%	3.436%	3.436%	PFL-4337/48
Head Instability			1	0.042%	0%	0%	3.436%	3.436%	PFL-4313/84
IOEDC Error			1	0.042%	0%	0%	3.436%	3.436%	PFL-4302/10
Modulation			1	0.042%	0%	0%	3.436%	3.436%	PFL-4296/145
Offtrack Write			1	0.042%	0%	0%	3.436%	3.436%	PFL-4223/155
SPPL-140: Skip Write - Alpha Configuration - Drives have PCO and F3 CA	New clean stator wire	200 drive RDT run w/ clean stator wire, 750hrs w/o article related failure	1	0.042%	95%	100%	3.396%	3.394%	PFL-4306/54
SPPL-153: ABS Modulation-Post SAD			1	0.042%	0%	0%	3.436%	3.436%	PFL-4174/64
SPPL-161: GMD Due to Insufficient Padding - Post SAD	PCO 17.7C - Sinusoidal Padding Change. PCO 17.8 to include AFS10.0 TA Scan under Servo change		1	0.042%	40%	40%	3.419%	3.419%	PFL-3821/4
SPPL-164: NMD due to loose PZT			1	0.042%	0%	0%	3.436%	3.436%	PFL-3887/99
SPPL-168: 8kHz Modulation due to			1	0.042%	0%	0%	3.436%	3.436%	PFL-3942/549
SPPL-169: GMD Due to incomplete			1	0.042%	0%	0%	3.436%	3.436%	PFL-4117/63
SPPL-170: Bad Write from TI Preamp with Pre PCO17.7C	TI preamp Bad Write mitigation: Opti 19.5 changes in PCO17.7C, out in W/V1243	PCO17.7C fixes validated on 22 previous bad write failures in LCO	1	0.042%	95%	95%	3.396%	3.396%	PFL-4157/308
SPPL-172: Aborted Write due to Power Reset - Test Equipment Related			1	0.042%	100%	100%	3.394%	3.394%	PFL-4267/376
SPPL-173: unqualified material escaped to mass production			1	0.042%	0%	100%	3.436%	3.394%	PFL-4329/322
Total Number of Fails			81		Reduced AFR:		2.35%	1.79%	
					Corresponding MTBF:		100K	132K	



Transition: Grenada → GrenadaBP



Assumptions

- May Outlook RevPlan
- Late May Disti SAD / OEM CTU; Targeting 5/30 (SBS SAD achieved 4/23)
- Transition represents aggressive plan
 - Common ST Model number between Classic and BP (Disti and Retail transition flexibility)
- Current "MS GrenadaBP" volumes include NLL

GrenadaBP Lifetime Volume

By Segment

Segment	GB	FY12		FY13		FY14					Grand Total	
		Qtr4-12	Qtr1-13	Qtr2-13	Qtr3-13	Qtr4-13	Qtr1-14	Qtr2-14	Qtr3-14	Qtr4-14		
CE	1000	0	100	150	200	200	150	231	145	0	1,175	
	2000	0	50	100	150	150	125	109	63	0	747	
	3000	0	24	24	20	22	17	19	19	0	145	
CE Total		0	174	274	370	372	292	359	227	0	2,067	
Desktop	1000	0	2,059	4,987	6,286	8,055	8,894	7,270	4,691	0	42,241	
	2000	0	904	2,034	2,938	3,328	3,485	2,711	969	0	16,370	
	3000	0	195	410	600	755	760	404	167	0	3,289	
Desktop Total		0	3,158	7,430	9,824	12,137	13,139	10,385	5,827	0	61,900	
Nearline	1000	0	45	69	95	109	104	122	112	109	764	
	2000	0	180	262	254	270	360	365	313	314	2,317	
	3000	0	175	269	351	366	428	486	525	459	3,059	
Nearline Total		0	400	600	700	745	892	972	950	882	6,140	
Retail	1000	20	126	200	226	166	108	0	0	0	845	
	2000	47	281	462	587	572	482	0	0	0	2,429	
	3000	19	100	200	253	272	172	0	0	0	1,015	
Retail Total		86	507	861	1,065	1,009	762	0	0	0	4,290	
Grand Total		86	4,238	9,166	11,958	14,263	15,084	11,716	7,004	882	74,397	

Source April Outlook RevPlan
Transition to GrenadaBP2 beginning in FQ4-13

Grenada/BacallBP Phase 0 Contract: October 31, 2011

	Metric	GrenadaBP	BacallBP	Variance	Comments
Schedule	Gen 1 Declare	11/11/2001		+ 30 days	
	Gen 2 Declare	1/4/2012		+ 30 days	
	Gen 3 Declare	N/A		+ 30 days	
	CTU Declare / SBS SAD	2/10/2012		+ 30 days	First milestone achieved: CTU or SBS SAD
	SAD	3/30/2012		+ 30 days	OEM SAD
Business	Volume	57.8M	19.7M	-10%	Per market segment derived variance
	Revenue	\$2867M	\$881M	10%	Per market segment derived variance
	Extended Variable Margin \$	\$946M	\$285M	NA	This metric is informational only
	Product TVC at SAD	1D = \$30.12 2D = \$39.43 3D = \$48.45	1D = \$30.12 2D = \$39.43	+2%	This measure is the high volume configuration; denote as such Per market segment derived variance List all configs in Phase Zero package
	Product TVC at 3rd Qrt Volume	1D = \$29.26 2D = \$38.17 3D = \$46.83	1D = \$29.26 2D = \$38.17	+2%	This measure is the high volume configuration; denote as such Per market segment derived variance List all configs in Phase Zero package
	CQC90%	60 days	80 days	+ 30 days	#days from OEM CTU declare - date identified at Gen 1
	PTC90%	150 days	160 days	+ 30 days	#days from OEM CTU declare - date identified at Gen 1
Budget	Drive Start Budget: # units & \$	11,708 - \$815K	7853 - \$370K	+10%	Core Team owned: finance provides \$\$ allocated to the program; core teams defines config plan builds based on \$\$ budget
Eng	RMO Native and Composite Prime yield at SAD	Same as Grenada	Same as Bacall	- 10%	Composite of all media factories combined
	RHO Native and Composite capacity yield at SAD	Same as Grenada	Same as Bacall	- 10%	RHO commitment to core team; If no composite yield, note: NA
	Drive Native and Composite Yield at SAD	6H 3TB -61.0% 4H 2TB-79.0% 2H 1TB-85.0%	4H 2TB -76.0% 2H 1TB-81.0%	-5%	This measure is the high volume configuration; List all config ylds in Ph0 package; If no composite yld - note: NA
	Test Time at SAD	6H 3TB -107.7 4H 2TB-73.2 2H 1TB-38.6	4H 2TB -84.8 2H 1TB-44.4	+5%	This measure is the high volume configuration; List all config test times in Phase Zero package
Reli	SAD DPPM: Product	Desktop: 2K	DVR: 1K		Metric set by Reliability at Phase 0 Exit: CTU/SAD Process and Launch Criteria
	SAD MTBF or AFR: Product	Desktop: 250K	DVR: 550K		Metric set by Reliability at Phase 0 Exit: CTU/SAD Process and Launch Criteria
Supply Chain	100% of Suppliers on SSP at AML AE/AB or equivalent @ CTU	100%		None	
	CHI Score	1.67	2.25	+ 10%	

☐ HMRB9.6 Extension:

- Until the next reader migration can be clearly established and qualified, efforts are under way to improve the HMRB9.6 in-coming head quality.

☐ Near-Term:

- Open Spec Build completed for identifying head instability transfer functions between Drive and ET/ISI.
 - New ET test suites employed. Reader Bias Swept SGRO (80 – 150mV), New WIJITA, ROJITA (with Single Htr and Dual Htr).
 - Expect conclusion of analysis by FW47. Potential new ET stability specs by FW48 (pending identification of transfer functions).

☐ Mid-Term:

- 5-cell DOE with ISI Reader Heater heat and new ISI test suites.
 - ISI powers of 35mW and 50mW (currently using 25mW).
 - New ISI tests such as 3-point SMAN (in addition to single-point SMAN), 100 cycle QST, 3 cycle transfer curve etc.
- HGA build on-going (FW46).
- Expect Analysis conclusion from Drive builds by FW49.

☐ Long-Term:

- Bar-baking DOE designed. Bars will be baked at 135°C for 4 hours.

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Spec Committed, Potential Penalty

CTQ	Status	Comments
Performance		
TTM		Communicating June CTU with OEMs Disti transition planned for FQ1
Cost		56% Contribution margin based on Apr 2012 CMC
Reliability		
Power		
Features		
Acoustics		
Emitted Vibe		
Environment		

Grenada v GrenadaBP Comparison

April CMC FY12

	Total TVC				
	Qtr4-12	Qtr1-13	Qtr2-13	Qtr3-13	Qtr4-13
GRENADA 2/1 SATA	\$27.82	\$26.71	\$26.27	-	-
GRENADABP 2/1 SATA	\$28.97	\$27.40	\$26.42	\$25.94	\$25.71
Variance	(\$1.15)	(\$0.69)	(\$0.16)	-	-
GRENADA 4/2 SATA	\$38.26	\$36.40	\$35.44	-	-
GRENADABP 4/2 SATA	\$39.82	\$36.57	\$35.46	\$34.74	\$34.41
Variance	(\$1.56)	(\$0.17)	(\$0.01)	-	-
GRENADA 6/3 SATA	\$42.35	\$40.90	\$39.87	-	-
GRENADABP 6/3 SATA	\$46.23	\$40.56	\$40.22	\$39.76	\$39.40
Variance	(\$3.88)	\$0.34	(\$0.35)	-	-

Total TVC w/o Warranty				
Qtr4-12	Qtr1-13	Qtr2-13	Qtr3-13	Qtr4-13
\$27.00	\$26.11	\$25.83	-	-
\$26.56	\$25.91	\$25.51	\$25.29	\$25.05
\$0.44	\$0.20	\$0.32	-	-
\$37.26	\$35.49	\$34.75	-	-
\$36.48	\$34.93	\$34.12	\$33.74	\$33.41
\$0.79	\$0.56	\$0.63	-	-
\$41.19	\$39.47	\$39.10	-	-
\$40.49	\$39.06	\$38.61	\$38.32	\$37.96
\$0.70	\$0.42	\$0.49	-	-

Notes:

- A significant part of warranty cost is based on who we sell to vs product specific issues.
TVC warranty is based on a weighted average of all the channels for that particular product.
GrenadaBP is heavily weighted towards Disti (more expensive) whereas Grenada Classic has more OEM (less expensive).
- Warranty established a WRR takedown curve for GrenadaBP as if it were a new product.
This causes the return rate to look higher than expected vs Grenada Classic.
Brent Vandervliet and team are working with reliability to address this issue.
- The cost savings (shown in the TVC w/o warranty section) is based on lower PCBA and better yields.

Competitive Outlook: 3.5" Client

CY		CY11				CY12				CY13
QTR		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
7200RPM	STX	MantaRay ²	Grenada ³	Grenada ² Megaladon ³			Megaladon ²		Grenada SSH	Crawford
	WD						4TB 5D ¹ ? 1TB 1D ¹	Dell-1TB CTU's in May Samples - Buffalo I/OData		
	HGST	2TB 3D		1TB/d ¹	1-3TB ¹	4TB 5D ³	4TB 5D 2/3TB 2/3D ²	Interior-white.jpg		8TB, 7Disk
	Toshiba	1,2TB 2-4D					?	4TB ES – Awaiting avail		
	Samsung				1TB/d ¹	1TB/d ²		DT 2/3TB in qual ASUS, ACER		
5XXXRPM	STX			Bacall ²					Lombard 4TB	
	WD					1TB/D ² 1D	4TB 5D ¹ ?	→		1TB/D ² 2-3D?
	HGST			1TB/d ¹	4TB 5D ³					
	Samsung				1TB/d ¹	1TB/d ²				

Code name Diablo, mov
CTU sample to Oct .

Foot notes

1 - Sample 2 - Volume
3 - Retail 4 - Nearline

Outlined in Red = Received

Positioning information comes from public information and customer feedback provided by the PLM teams

- Competitors releasing/have released 1TB/platter. Low cost GrenadaBP key to winning at 7200RPM 1TB/platter.
- Expect HGST & WD to continue to operate independently, per MOFCOM restrictions through CQ1'14

